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THE COMPARATIVE MOTOR
DEVELOPMENT OF BAGANDA,
AMERICAN WHITE, AND AMERICAN
BLACK INFANTS¹

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Baganda infants in Uganda were found to be significantly advanced in motor development during the first year of life when compared with Bayley's sample of American White and Black infants. Though they were not found to be as precocious as Geber's sample of Ugandan infants, the same downward trend in degree of motor development during the second year of life was found. As age increased, developmental motor quotient (DMQ) decreased, but at 24 months of age the Baganda infants still obtained an average DMQ higher than either American sample. Several interpretations of these results are considered. [Uganda; Baganda; growth; infants; motor development]

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SEVERAL INVESTIGATORS of infant motor development (Bayley 1965; Knobloch and Pasamanick 1953; Pasamanick 1946; Walters 1967; Williams and Scott 1953) found that American Black infants were advanced in motor performance when compared with American White infants. Explanations of this difference have included genetic and environmental factors. Similar findings have been reported by examiners of infants from other societies. Curti, Marshall, and Steggerda (1935), for example, discovered that one-, two-, and three-year-old Jamaican Black children were precocious in age of creeping, standing, and walking when compared with New Haven White children. Particularly relevant to the present investigation of Ugandan infants are the studies of Marcelle Geber and R. F. Dean. Geber and Dean (1957a), using Gesell tests,

examined 183 African (mostly Baganda) children between one and seventy-two months of age, living in the urban area of Kampala, Uganda. They reported that most of the healthy children were precocious in their psychomotor development and that the precocity was greatest among the younger children, tending to diminish toward the end of the second year. Because there were marked differences in behavior and in results of tests between children examined before and after weaning, Geber (1958) considered this decrease in precocity might be related to childrearing practices. In another study by Geber and Dean (1957b), 107 neonates were examined by another procedure. The motor activity of these African newborns was reported to be four to six weeks more advanced than European infants. This precocity was thought to have a genetic basis because it was evident in the first week of life. Geber's ideas about the influence of genetic and environmental factors on Ugandan infants' motor development will be discussed in conjunction with our own findings below.

Our primary purpose was to investigate the motor performance of a sample of rural Baganda infants in Uganda. Because earlier findings of accelerated motor development of American Black and Ugandan infants may have resulted, in part, from poor test instrumentation, different means of obtaining developmental quotients (Cobb 1958:867-868), and difficulties in interpretation and evaluation of infant behavior (Knoblock 1958:601-603), we have concentrated on rectifying these difficulties in our investigation. A group of Baganda infants was selected for testing in order to validate previous findings concerning the advanced state of their development (see Ainsworth 1967; Geber 1958; Geber and Dean 1957a, 1957b).

Description of the Motor Development Test. The original California Infant Scale of Motor Development (Bayley 1935) and an expanded, 1960 revised version of it—the Bayley Scale of Infant Motor Development (Bayley 1961, 1965)—were the instruments selected for testing.² The 1960 test was administered by Bayley to approximately 1,400 children aged 1-15 months and to a pilot sample of 160 children aged 18-30 months.

Werner and Bayley (1966:40) state that the test was revised because of reports of an accel-

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eration of today's infants in gross motor, personal, and social development. Although the age placement norms differ, the individual test items on the 1935 and 1965 tests are essentially the same with only minor modifications. The items are arranged from least to most difficult, with 50 percent as the criterion for age placement norms. Items included in both tests are, for example, (1) dorsal suspension, lifts head; (2) pulls to standing position by *E*'s thumbs; (3) dangling ring: approaches and grasps; (4) cube: complete thumb opposition; (5) fine prehension with pellet; (6) throws a ball; (7) walks alone (Bayley 1961). Generally the tests require about fifteen to twenty minutes to administer, with the exception of older, less cooperative, and/or more frightened infants, who usually require about thirty minutes.

Procedures and Samples. In the early stages of fieldwork preliminary observations were made of infants in their domestic surroundings in order to learn about childrearing practices related to motor development (Williams and Scott 1953). Rapport was easily established through long-term residence in the community by the research team.

A testing location was obtained in the Mulago Government Hospital in Masaka. Three-fourths of the sample was tested in the Child Welfare Clinic, a large, one-room building at the hospital. The other children were tested in their homes in several rural villages

near Masaka.⁸ The testing procedures are described by Bayley in her 1961 manual, with the exception that for those infants tested at home a straw mat placed on the floor was used instead of a table. Our sample consisted of 163 rural Baganda infants (seventy-one males and ninety-two females), ranging in age from one through twenty-four months.⁴

General Motor Performance. The over-all motor development of our sample was found to be above average (see Tables 1 to 4 and Figure 1), with mean, median, and mode scores of 123 (SD = 15.54), 123, and 124, respectively, earned on the revised test (Bayley 1961). On the 1935 test (Bayley 1935), the mean, median, and mode scores were 145 (SD = 16.57), 142, and 139. When the sample was divided into above average (111 or above), average (90-110), and below average (89 or less), 75.46% ($n=123$) of the infants were found to be above average, 23.31% ($n=38$) were average, and 1.23% ($n=2$) were classified as below average according to their developmental motor quotients (DMQ's) on the revised test. On the 1935 test, 95.79% ($n=156$) were above average, 4.2% ($n=7$) were average, and none were below average.

Comparison of Baganda and American Black Infants. Because of the small sample size at some ages, certain key ages (1, 4, 5, 6, 9, 12, 18, and 24 months) were used for much of the statistical analysis. The results of a *t*-test com-

TABLE 1. COMPARISON OF BAGANDA AND AMERICAN POINT SCORES

Age (Mos.)	Revised test						t
	Baganda			American*			
	N	Mean point score	S.D.	N	Mean point score	S.D.	
1.0	3	9.00	.82	87	6.40	2.03	4.21§
4.0	15	23.27	3.21	89	15.16	3.07	8.82§
5.0	7	27.43	4.03	85	20.08	3.52	4.35§
6.0	11	30.55	4.76	93	25.71	4.64	3.20§
9.0	14	44.71	4.68	103	37.69	4.35	5.13§
12.0	13	49.00	3.37	100	45.41	3.77	3.44§
18.0	7	55.57	2.19	90†	53.10	3.80	2.52†
24.0	10	63.90	3.24	91†	60.00	5.20	3.22§

* Bayley's total sample which includes both White and Black infants (1965: 386).

† Because Bayley's *N* for ages twenty-four and eighteen months were not then available, the median of the *N*'s of the first fifteen months was used.

‡ $p < .02$

§ $p < .01$

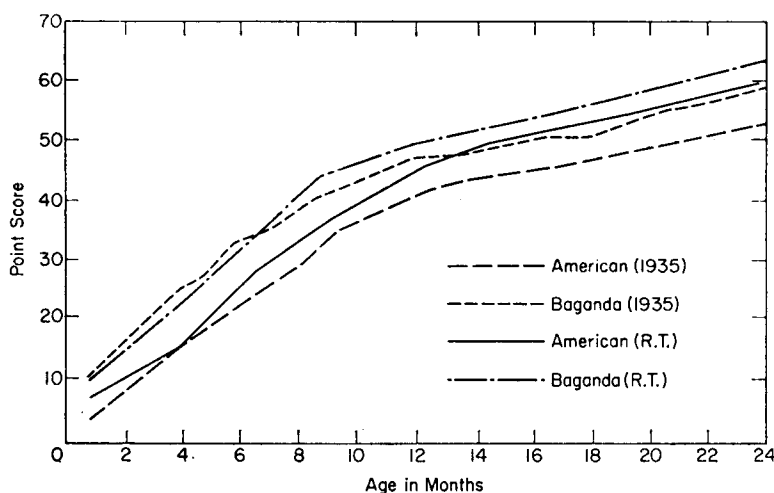


FIGURE 1. Comparison of point scores between American and Baganda infants on Bayley's 1935 and revised tests.

paring mean point scores (sum of total items passed) for each of the key ages of Baganda infants and Bayley's American sample (including White and Black infants) showed the former to be significantly more precocious in motor development (see Table 1). Differences were greatest at ages four, five, and nine months. When Bayley's (1965) sample was divided into White and Black infants, Baganda infants were found to be significantly more advanced than both American White infants at each age level and Black infants at all age levels during the first year. At eighteen and twenty-

four months, no significant differences were found between the Baganda and Bayley's Black sample. The Baganda scored slightly higher at twenty-four months whereas American Blacks scored slightly higher at eighteen months (see Table 2).

The Baganda infants in the present study, however, were less precocious than Geber and Dean's sample. Although not specifically stated by Geber and Dean, it was assumed that the averages they reported were medians because this is the measure usually represented in age placement norms. Table 3 shows that

TABLE 2. COMPARISON OF BAGANDA, AMERICAN WHITE AND BLACK POINT SCORES*

Age (Mos.)	Revised test										
	Baganda			American White				American Black			
	N	Mean	S.D.	N	Mean	S.D.	t	N	Mean	S.D.	t
1.0	13	9.00	0.82	41	6.34	2.03	4.03†	41	6.39	2.98	3.50†
4.0	15	23.27	3.21	47	14.57	3.20	8.87†	31	16.29	2.92	6.90†
5.0	7	27.43	4.03	41	18.83	3.32	4.98†	40	21.25	3.46	3.56†
6.0	11	30.55	4.76	44	25.73	4.40	2.92†	42	25.76	4.78	2.85†
9.0	14	44.71	4.68	54	37.13	4.06	7.49†	44	38.95	4.17	3.98†
12.0	13	49.00	3.37	49	44.22	3.16	4.45†	43	45.88	4.42	2.63†
18.0	7	55.57	2.19					10	56.50	2.50	0.76
24.0	10	63.90	3.24					10	61.60	2.40	1.71

* Bayley's White and Black data for first year are from Bayley (1965:405). Months eighteen and twenty-four are from written communication, 1968, between Dr. N. Bayley and Dr. I. Harms.

† $p < .02$

‡ $p < .01$

TABLE 3. MEDIAN PERFORMANCE OF BAGANDA INFANTS ON SELECTED GESELL ITEMS

Item	Geber	Kilbride <i>et al.</i>
Midposition head predominates	1.0	1.2
Pulled-to-sitting, head lags only initially or completely compensates	1.0	1.8
Supported sitting, head steadily erect	1.0	2.0
Supports large fraction of weight more than momentarily	2.0	2.0
Sits alone, good coordination	5.0	6.0
Stands alone*	7.0	9.0
Walks with help*	8.0	8.6
Walks alone*	9.0	11.7
Runs	12.0	17.9

* Bayley item similar to Geber's description of Gesell item.

Geber's sample of infants performed each of the motor items (except "supports large fraction of weight more than momentarily") at earlier ages than did the Baganda infants in our sample. This difference is especially notable in items dealing with standing and forward progression. One infant was running at fifteen and one-half months, and there were no infants nineteen months or older who could not run.

In comparing the average DMQ's obtained by Geber and Dean (1957a) with those obtained from our sample, it was necessary to compute three different measures of central tendency because the former investigators reported averages as "usual scores" without specifying what this meant. Therefore, we have reported the mean, median, and mode scores (see Table 4).

Age Differences. The same trend toward decreased DMQ's with increased age was found in both Geber's (1957a) and our sample. A definite decrease in degree of development was found when our Baganda sample was divided into the following age categories: 1-6 months (79); 7-12 months (43); 13-18 months (23); and 19-24 months (18). The respective means were 130.57 (SD=18.91); 120.93 (SD=13.93); 116.04 (SD=15.39); and 108.56 (SD=11.39). An analysis of variance for age revealed significant differences among age levels ($F=11.95$; $df=3$; $p<.001$). Although DMQ decreased as age increased at twenty-four months of age the Baganda infants were still demonstrating an above average degree of motor development (DMQ's above 100). In contrast, investigators of American Blacks (Knobloch and Pasamanick 1953; Williams and Scott 1953), with the possible exception of Bayley (1965), found no decrease in motor performance corresponding to an increase in age.

Sex and Birth Order Differences. A comparison of mean point scores of male and female infants revealed no significant sex difference in point scores except at one month of age where females exceeded males. The sample, however, was probably too small (males=1, females=2) to be meaningful. In addition, a two-way analysis of variance by sex and birth order (first born, subsequent born) for age levels 1-6, 7-12, 13-18, and 19-24 months showed no significant differences.

Discussion and Conclusions

Our findings clearly support Geber and Dean's (1957a, 1957b) findings that Ugandan

TABLE 4. COMPARISON OF AVERAGE DMQ'S OF BAGANDA INFANTS WITH GEBER'S UGANDA INFANTS

Age (Mos.)	Uganda			Revised test			1935 test		
	N	U.S.	Range	N	Average	Range	N	Average	Range
1-6	33	140	106-345	79	Mo. 141 Md. 128 Mn. 131	98-185	79	Mo. 152 Md. 152 Mn. 158	119-236
7-12	34	135	100-150	43	Mo. 124 Md. 123 Mn. 121	89-167	43	Mo. 138 Md. 138 Mn. 134	97-173
13-24	50	110	100-150	41	Mo. 106 Md. 100 Mn. 112	91-149	41	Mo. 123 Md. 112 Mn. 134	93-173

infants (with our sample consisting entirely of Baganda) are advanced in motor performance when compared with American norms (Bayley 1965). The degree of development for our sample of rural Baganda infants is not so precocious as that found by Geber and Dean, but various reasons, such as sample differences (one tribe vs. several tribes, rural vs. urban), examiner differences (in administration, interpretation, and scoring), use of different evaluative instruments (Bayley vs. Gesell tests), and modernization (changes in child care during the past twelve years) might account for the discrepancies.

Reasons for the advanced motor development of Baganda infants may be both genetic and environmental. Previous mention has been made of Geber's (1968) study of newborn Ugandan infants. In reference to this study, Geber and Dean state:

No explanation was offered for the precocity, but it was fairly clear that it had a genetic basis. There was, unfortunately, no way in which the length of gestation could be determined. The dates of the last menstruation were not accurately known [1957a:1061].

We were also unable to obtain information concerning the length of the gestation period. This would certainly be a factor to investigate in any further research.

Another factor that may contribute to precocity is the attitude and activity of the mother. Geber (1958) believes that the placidity and greater physical activity of the Ugandan woman during pregnancy, as well as her favorable acceptance of motherhood, may be important.

Also of interest is the possibility that the precocity of Black infants may be related to "optimal intrauterine and perinatal" conditions. Jensen (1969:69), for example, notes that "since abdominal decompression results in infant precocity, one may wonder to what extent differences in intrauterine pressure are responsible for normal individual and group differences in infant precocity."

The manner in which Baganda children are reared must also be considered a possible explanation for their precocity. The most readily observable difference is that mothers usually carry their infants on their backs rather than in their arms. This practice may reinforce the infant's ability to hold his head firmly because he must learn to compensate for his

mother's movements. In addition, the sitting position maintained on his mother's back may aid him in sitting alone at an earlier age than the American child. Close physical contact also affords the infant considerable visual and auditory stimulation as he travels about with his mother. Contrast this with leaving a child in his crib for much of the day (even mobiles can get boring!).

Differences can also be noted in the way Baganda and American mothers handle their infants. A Muganda mother usually picks up her infant with her hand around his chest, without supporting his head or back. She may even lift him by one of his shoulders. Mothers at the clinic were also observed lowering their newborns into "cribs" in this manner. Toilet training provides another interesting comparison. Training takes place gradually and casually. The infant is held out by his mother whenever he begins to urinate. He is also placed in a squatting position on the ground in order to defecate. This perhaps strengthens muscular development in his legs and back. Therefore, Baganda childrearing practices may be contributing to the infant's rapid development.

It is important to emphasize that we, like Geber and Dean, found a decreasing degree of development with increasing age. Geber (1958) and Welbourn (1963) have suggested that the reason for this relative decline might be the psychological and nutritional deprivation of the older infant. Welbourn (1963) notes that European children generally receive less attention and more frustration than Baganda children during the first year of life, and states that:

after weaning [the infant] his mother withdraws herself from close physical contact and begins to subject him to discipline. This sudden change comes at an age when many children suffer from infections and malnutrition which may be made worse by the loss of appetite due to mental disturbance following weaning [1963:128].

Although the mothers we questioned emphasized that they did not discipline the child until "he was old enough to understand," once formal training began mothers often used stricter methods such as "beating him," "tying him on a rope," "putting him inside his room and locking it," and "depriving him of food." Though most mothers reported that they used physical punishment, the other three methods were reported by several mothers.

Only one mother (out of thirty-nine responding to a questionnaire) said that she never used physical punishment, preferring to reprimand the child verbally.

From this brief description of childrearing practices it can be noted that, generally, Baganda mothers are permissive in their child-rearing methods at least until the child can understand (sometime during the second year of life, when the child begins speaking). Then strict discipline usually begins. We would suggest that the probable relationship between reversal of child care practices and reversal of motor development deserves careful attention.⁵

The results of the present investigation are, of course, tentative, pending further research under more controlled conditions with larger samples. We are presently involved in examining the possible role of additional factors (for example, parental education and occupation, and other childrearing practices). We hope that this report will encourage others to explore the problem of infant motor development. Because motor activities contribute greatly to the infant's development in his early life, it is important for him to meet with success in this area. Of particular importance for further research are:

(1) A longitudinal study from infancy through preadolescence of the motor and mental development of Baganda children, including information for each child on genetic constitution, mother's prenatal care, child's nutritional and medical history and childrearing practices, enabling controlled comparisons to be made;

(2) The examination of similarities and differences between those Baganda infants who show a decreasing rate of motor development with age and those who do not;

(3) The development of mental and motor performance norms for Baganda infants as a whole so that doctors can successfully evaluate an individual child's current health and developmental progress in relation to other infants from similar genetic and cultural backgrounds;

(4) Testing and comparing African populations other than the Baganda, in order to determine whether early precocity and subsequent decreasing rate of development are present among other African infants.

With the nature-nurture controversy still very much alive (see Jensen 1969), comparative

studies of growth and development in different cultures can broaden our knowledge of the role of genetic and environmental factors in contributing to the similarities and differences among human populations.

Notes

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² The authors would like to acknowledge their thanks to Professor N. Bayley for permission to use her revised motor development test and norms.

³ For descriptive information on the socio-cultural system of the Baganda, their child-rearing practices, and the area where the present study was conducted, the reader is referred to Ainsworth (1967); Fallers (1960); Jelliffe (1963); Rutishauser (1963); Southwold (1965); Welbourn (1963); Kilbride and Robbins (1969); Robbins and Azer (1968); Robbins and Pollnac (1969); and Robbins et al. (1969).

⁴ For further information on the sample, procedures, and investigation of other factors, see Kilbride (1969).

⁵ Presently, through child welfare clinics, the Baganda are being "educated" about different aspects of childrearing (for example, schedule feeding and nutritional needs of the infant). It is hoped that those practices that appear to be beneficial to their infants' development (for example, breastfeeding, carrying the child on the back, permissive toilet training) will not be rejected in favor of blind acceptance of Western practices, especially those Americans themselves no longer accept. For example, many Baganda mothers are taught to feed their infants according to a schedule instead of on demand. Many mothers in answering our questionnaire said that they fed their children according to a schedule, but our observations of their actual behavior disclosed that they continued to demand feed.

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SEXUAL INVERSION AMONG THE AZANDE

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Male and female homosexual relationship seems to have been common among the Azande in past times. Between males it was approved of in the bachelor military companies. Between females it is said to have been a frequent, though highly disapproved of, practice in polygamous homes. [Sudan (southern); Azande; sexual inversion]

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It is beyond question that male homosexuality, or rather a sexual relationship between young warriors and boys, was common in